

Demographic and Clinical Characteristics of Patients Who Underwent Thyroidectomy in Southern Population of Iran Based on Iranian National Thyroid Surgery Registry (INTSR)

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Abstract:

Background and Objective: Thyroid malignancy is a fairly common cancer which had an increasing rate of incidence in the recent years. This disease presents itself as nodular lesions. Thyroidectomy is a standard procedure for managing patients with thyroid malignancies. This disease is also prevalent in the population of southern Iran and makes up the majority of the endocrine malignancies. Due to the importance of the disease, in this study we aimed evaluate the demographic and clinical characteristics of patients who underwent thyroidectomy in southern population of Iran.

Materials & Methods: This cross-sectional study uses the data extracted from Iranian National Thyroid Surgery Registry (INTSR). All the patients who underwent thyroidectomy during 2023 and 2024 and did not fulfill any exclusion criteria are enrolled in the study. Demographic data, medical history, familial history, laboratory data, and details of their surgery are extracted and evaluated.

Results: Of all the 1409 patients in the study, 274 (19.4%) were males and 1135 (80.6%) were females. The mean age of the patients was 44.33±12.96. the most common surgery was total thyroidectomy (13.7 (92.8%)). The most common pathologic findings after surgery were PTC classic type (32.2%), MNG (19.7%), PTC follicular type (17.7%), PTMC (15.1%), benign nodular hyperplasia (14.7%), Hashimoto (2.6%), parathyroid adenoma (2.4%), graves' disease (1.8%), Hurthle cell carcinoma (1.4%), and MTC (0.7%), respectively. The most common FNA findings were as follows: PTC (43.9%), benign findings (17.1%), AUS/FLUS (7.9%), MNG (7.9%), and graves' disease (2.3%), respectively.

Conclusion: In this study, the demographic and clinical data of patients who underwent thyroidectomy is evaluated. PTC was seen to be the most prevalent pathology among the patients. The majority of patients who underwent thyroidectomy were women. The most common FNA result was also PTC. Further studies are required to deepen our understanding of risk-factors and predisposing factors of thyroid malignancies and improve the treatment quality.

Keywords: *Thyroid Surgery, Thyroid cancer, epidemiology, Thyroid Nodules*

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Background and Objective

Thyroid cancer is the most prevalent malignant endocrine tumor in humans. The incidence of thyroid malignancy has increased in developed countries in recent years.^{1,2} The occurrence of this malignancy had an upward trend in Iran, too.³ Some experts have described the improvement of diagnostic tools and screening guidelines as the cause of these increases; however, others associate the increasing diagnosis essentially with the increase of the disease incidence itself.^{4,5}

Most often, thyroid malignancies stem from follicular thyroid cells. The most common types are papillary thyroid carcinoma, follicular thyroid carcinoma, medullary thyroid carcinoma, and anaplastic carcinomas.^{6,8} Thyroid malignancies are commonly present themselves as thyroid nodules. Studies have reported that 7-15% of thyroid nodules are malignant in nature.⁹⁻¹¹

With careful history taking and physical examination, and evaluating laboratory data, thyroid imaging, and thyroid biopsy, the malignancy risk of thyroid nodules could be measured and initiate proper medical management. Thyroidectomy is the common standard procedure for treating differentiated thyroid lesions.^{12,13} The 2015 guideline of American thyroid association have suggested total thyroidectomy for patients with low to moderate risk of malignancy.¹³ Furthermore, total thyroidectomy with central lymph node dissection is suggested for patients with PTC, whose imaging is suspicious of metastasis to lymph nodes. Nevertheless, recent studies have questioned the advantages of this method.¹⁴⁻¹⁶

In Iran, thyroid cancer is one of the most common malignancies, to the extent that it is the third common malignancy among the female population.^{17,18} Recent studies have reported a 3.5% prevalence for thyroid malignancies in Iran, which encompasses 76.1% of all endocrine malignancies.¹⁹

Moreover, thyroid malignancies are common in southern Iran and especially, Fars province, with increasing incidence in recent years.^{20,21}

Due to the high frequency of thyroid cancer and its imposed burden on healthcare system, we aimed to investigate the clinical and demographic characteristics of patients who underwent thyroidectomy in southern Iran, using Iranian national thyroid surgery registry (INTSR). This study could lay a foundation for further large multicenter studies aimed to improve the screening, diagnosis, treatment, and follow-up of patients with thyroid malignancies.

Materials and Methods

The aim of this cross-sectional study is to evaluate the demographic and clinical characteristics of patients who underwent thyroidectomy in southern population of Iran (Fars) during 2023-2024 based on Iranian national thyroid surgery registry (INTSR). STROBE guidelines are utilized to increase the accuracy of the reporting.²²

Pre-hospital, surgical, and post-operation data are gathered by the surgeon and his assistant researchers and recorded in the INTSR. All the data from the INTSR is cured and evaluated by a statistics expert. Outliers, incorrect or incomplete records, and those who refused to undergo surgery are excluded from the dataset.

In total, 2044 records were available in the INTSR, which reduced to 1409 cases after data curing. Demographic data (including age and gender), clinical data (history of previous diseases, family history of diseases, previous surgeries, and so forth), pathologic findings (before and after surgery), and laboratory data (before and after surgery) are evaluated.

Quantitative variables were reported as mean and standard deviation, whereas qualitative variables were reported as prevalence and percentage. IBM SPSS version 26 was used for statistical analysis.

Findings

Overall, 1409 patients were evaluated. Respectively, 274 (19.4%) and 1135 (80.6%) of the cases were males and females. The mean age of the population was 44.33 ± 12.96 (figure 1). 91 (6.5%), 70 (5%), 74 (5.3%), 144 (10.2%), 194 (13.8%), and 9 (0.6%) of the patients had history of hypothyroidism, hyperthyroidism, diabetes mellitus, hypertension, and recurrence of the tumor, respectively. Moreover, 195 (13.8%) of the patients had history of thyroid surgery in first degree relatives (table 1).

Laboratory data of the patients is explained in detail in table 2. The largest diameter of the tumor was 1.57 ± 1.34 centimeters on average. 1307 (92.8%) of the patients underwent total thyroidectomy, and 29 (2.1%) of the patients had parathyroid surgery. Radical lymph node dissection was performed in 54 (3.8%) of the patients (table 3).

Table 1- Demographic and history of the patients

<i>Variable</i>	<i>Mean Standard Deviation</i>
<i>Age, Mean±standard deviation</i>	<i>12.96±44.33</i>
<i>Gender, Number(%)</i>	
<i>male</i>	<i>(19.4)274</i>
<i>female</i>	<i>(80.6)1135</i>
<i>History of disease, Number(%)</i>	
<i>hypothyroidism</i>	<i>(6.5)91</i>
<i>hyperthyroidism</i>	<i>(5)70</i>
<i>diabetes mellitus</i>	<i>(5.3)74</i>
<i>hypertension</i>	<i>(10.2)144</i>
<i>Positive family history of thyroidectomy, Number(%)</i>	<i>(13.8)194</i>
<i>Recurrence of tumor, Number(%)</i>	<i>(0.6)9</i>

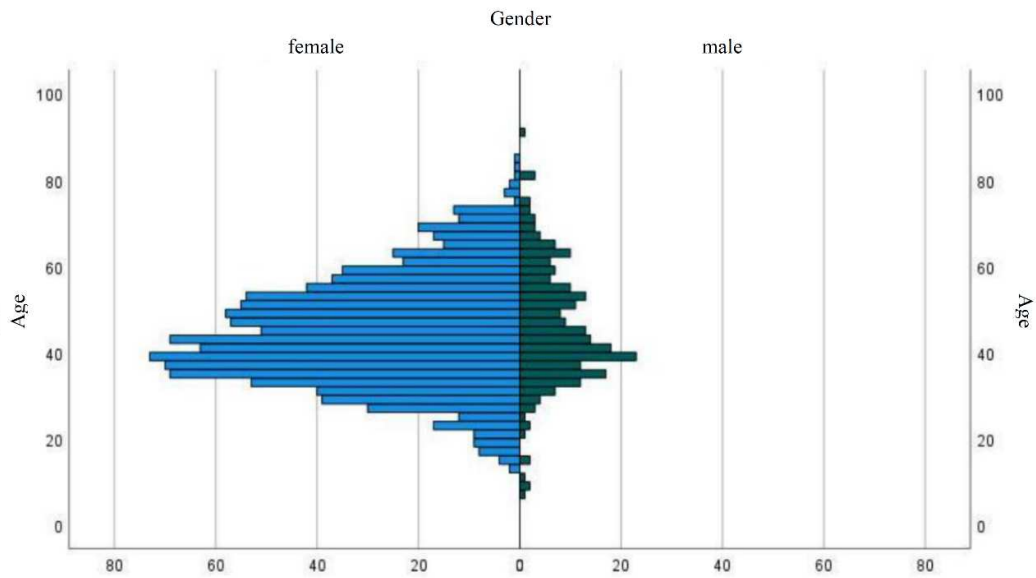


Figure 1- The distribution of the study population age and gender

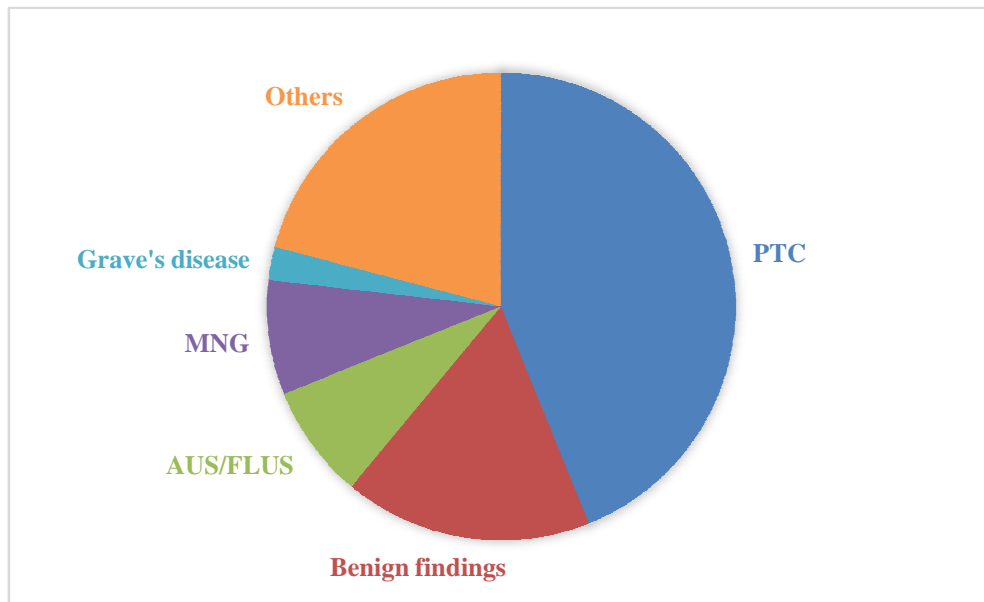


Figure 2- FNA findings of the patients

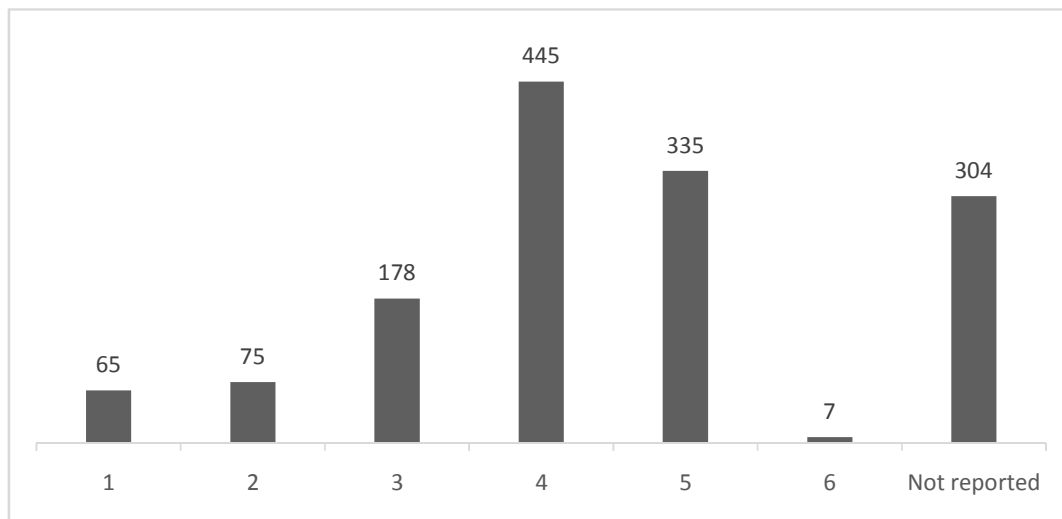


Figure 3- The frequency of reported TIRADs in sonography

Pathologic findings from tissue extracted during surgery is explained in detail in table 3. FNA findings of the patients were evaluated and are as follows: (43.9%) 619 PTC, (17.1%) 241 benign findings, (7.9%) 111 AUS/FLUS, (7.9%) 111 MNG, (2.3%) 32

Grave's disease (table 4) (figure 2). The frequency of thyroid imaging reporting and data systems (TIRADS) scores are as follows: (31.6%) 4, (23.8%) 5, (12.6%) 3, (5.3%) 2, (4.6%) 1 and (0.5%) 6 (figure 3).

Table 2- Laboratory findings of the patients

Pre-operative, Mean±Standard Deviation	
calcium	9.4±1.3
phosphorous	3.8±0.7
vitamin D3	32.5±14.7
parathyroid hormone*	52.9±38.4
thyroid stimulating hormone**	2.4±4
thyroglobulin	131.3±141.3
anti-thyroglobulin antibody	119.6±182.9
Post-operative, Mean±Standard Deviation	
calcium	9.2±0.9
vitamin D3	34.7±14.1
parathyroid hormone*	28.9±22.2
thyroid stimulating hormone**	12.5±16.5
thyroglobulin	24.5±58.8
anti-thyroglobulin antibody	106.8±103.7
*parathyroid hormone (PTH)	
**thyroid stimulating hormone (TSH)	

Table 3 Clinical characteristics of the patients

Type of surgery, Number(%)	Variable
total thyroidectomy	(92.8)1307
partial thyroidectomy	(2.7)38
parathyroidectomy	(2.1)29
others	(2.4)35
Lymph nodes dissection, Number(%)	
central	(45.8)645
lateral	(8.6)121
radical	(3.8)54
Largest nodule diameter in Cm, Mean±Standard Deviation	
	1.57±1.34
Pathology, Number(%)	
PTC classic type*	(32.2)453
PTC follicular type**	(17.7)250
papillary thyroid microcarcinoma***	(15.1)213
multinodular goiter‡	(19.7)277
Hashimoto disease	(2.6)36
benign nodular hyperplasia¶	(14.7)207
medullary carcinoma´	(0.7)10
Hurthle cell carcinoma§	(1.4)20
Grave's disease	(1.8)26
parathyroid adenoma	(2.4)34

* PTC classic type

** PTC follicular type

*** Papillary thyroid microcarcinoma

‡ multinodular goiter

¶ benign nodular hyperplasia

´ medullary carcinoma

§ Hurthle cell carcinoma

Table 4- FNA findings of the patients

<i>Variable</i>	<i>Frequency & percentage</i>
<i>Papillary thyroid carcinoma, * Number(%)</i>	<i>(43.9)619</i>
<i>Benign findings, Number(%)</i>	<i>(17.1)241</i>
<i>Atypia of undetermined significance/Follicular lesions of undetermined significance, ** Number(%)</i>	<i>(7.9)111</i>
<i>Multinodular Goiter, *** Number(%)</i>	<i>(7.9)111</i>
<i>Grave's disease, Number(%)</i>	<i>(2.3)32</i>
<i>Others, Number(%)</i>	<i>(20.9)295</i>

*papillary thyroidcarcinoma (PTC)

**Atypia of undetermined significance (AUS)/follicular lesions of undetermined significance (FLUS)

*** multinodular goiter (MNG)

Discussion

In this study we aimed to evaluate the demographic and clinical characteristics of patients who underwent thyroidectomy in southern population of Iran (Fars) using on Iranian national thyroid surgery registry (INTSR). Females underwent surgery more frequently compared to males. The majority of the patients were 40 to 50 years old. It was observed that the most common surgery was total thyroidectomy, and nearly half of the patients were undergone central lymph node dissection. The most frequent pathologic finding and the most common FNA finding was PTC.

Studies have reported that females are more susceptible to thyroid malignancies. Some studies even suggest that this difference could be as high as three to four times more.²³⁻²⁵ The findings of our study are in line with previous ones. The female population who underwent thyroid surgery was nearly four times the male population. This difference could be due to differences in lifestyle, behavioral, and biological varieties.

As an example, females typically pursue their physical pain and discomfort more often compared to men; therefore, it is more likely for them to seek medical attention; this in turn, increases the chance of thyroid disorder diagnosis by the physician.²⁶ Furthermore, it seems that hormonal differences between males and females play a role in the incidence rate of thyroid diseases. Studies have observed that estradiol can have protective effects against thyroid cancer.^{27,28} Further studies with consideration of various risk factors for disease incidence among males and females can shed light on this matter.

It was seen that nearly 10 percent of the patients had hypertension. Studies suggest that patients with hypertension have more incidence of more malignant thyroid diseases.²⁹ It is also seen that DM can increase the chance of thyroid cancer.^{30,31} Less than 1 percent of patients in this study have recurrence of thyroid cancer, which was less than the rate reported in previous studies.^{32,33} This difference can be due to demographic and clinical varieties among the

study populations. More comprehensive studies are required for clarifying this issue. Thyroid stimulating hormone showed an increase after the surgery. This is expected due to the decrease or absence of thyroid hormones. Serum level of thyroglobulin was decreased after the surgery. It is observed that serum thyroglobulin level could potentially act as a predictor of patients' response to the surgery and iodine therapy.³⁴

Most frequent surgery was total thyroidectomy, which is in line with previous studies. According to the latest guidelines, total thyroidectomy is a standard procedure for patients with low to moderate malignancy risk.^{35,36} In total, more than half of the patients required lymph node dissection. Studies also suggest that up to 60 percent of the patients have concomitant lymph node involvement with thyroid malignancy.³⁷⁻³⁹ Similar to previous studies, PTC and after that, follicular cell carcinomas were the most common pathologies among the patients.^{40,41} The most common finding in FNA was also PTC, which is in line with post-operative data. It is also observed that the

most common TIRADs scores were 4 and 5 among the study population. Studies have demonstrated that the most common TIRADs score among patients with thyroid lesions was 4, which is similar to our findings.⁴²⁻⁴⁴

Strengths and limitations

The demographic, clinical, and laboratory findings of the patients can provide a comprehensive view of population characteristics and be a foundation for more advanced studies. The limitations of this study are the lack of tumor exact location and size recording and single center nature of the study. It is also more accurate to use validated questionnaires for evaluating post-operative side effects.

Conclusion

The recorded data of patients who underwent thyroidectomy were evaluated in this study. It was shown that females have more frequently undergone thyroid surgery. PTC was the most frequent pathology finding among the patients.

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